Can Colonoscopy Diagnose Transmural Ischaemic Colitis after Abdominal Aortic Surgery? An Evidence-based Approach

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Objectives: to assess the diagnostic value of colonoscopy in ischaemic colitis following abdominal aortic surgery, based on a literature review, and to introduce the concept of evidence-based medicine.

Method: a review of the literature according to evidence-based principles was made by all doctors of our department.

Results: seven prospective non-randomised reports on routine colonoscopy after abdominal aortic surgery were found. None of the participants found all the reports, and the last was identified by the reviewer.

Conclusions: Endoscopy may disclose ischaemic colitis, but cannot separate transmural from the clinically less important mucosal ischaemia. Endoscopy had no impact on mortality in any of the prospective series. The evidence-based conference was an inspiring teaching modality, and illustrated for the participants the difficulty in performing a targeted literature search.

Key Words: Ischaemic colitis; Colonoscopy; Aortic surgery; Evidence-based medicine.

Introduction

Clinical diagnosis and decisions are often based on individual expertise and tradition. However, the use of current best available external evidence from basic or clinical research is often impeded due to several reasons, e.g. lack of time for clinicians to read and keep up to date, but also an inefficient approach to clinical learning.1 Evidence-based medicine seeks to combine the best external evidence from systematic research with individual clinical experience. The wish to facilitate and propagate evidence-based principles has led to the formation of The Cochrane Collaboration. This is a non-profit international organisation, which seeks to provide up-to-date accurate information about healthcare issues using meta-analysis and systematic reviews of available literature on randomised clinical trials.2 An example, questioning current clinical practice, urged us to seek best external evidence.

Ischaemic colitis is a well-known and potentially fatal complication of aortic surgery. Once the diagnosis is suspected, colonoscopy is the method of choice according to several recent publications based on reviews as well as original observations.3-7 However, we recently encountered two cases in which senior gastroenterologists failed to reach the diagnosis of transmural ischaemic colitis which was later disclosed at laparotomy. Both patients had been operated on for ruptured abdominal aortic aneurysms. The first patient developed septicaemia after 48 h, and colonoscopy at that stage was normal, though the view was not perfect. The following day laparotomy was performed, as tonometric monitoring indicated increasing acidosis, and the suspected transmural ischaemic colon (sigmoid and left colon) was found and resected. This patient died 9 days later in multi-organ failure. The other patient experienced a prolonged course after surgery, first with wound dehiscence demanding suture, later bowel obstruction, which subsided spontaneously, and finally persistent watery diarrhoea, up to 41/day, and fever. Sixteen days postoperatively colonoscopy was normal. Five days later the patient underwent a further laparotomy due to persistent fever and an air collection in the retroperitoneal space, seen on ultrasonography. Surgery revealed a necrotic sigmoid and left colon, which was resected together with the aortic prosthesis. Following extra-anatomic revascularisation, this patient eventually survived and was last seen alive 1.5 years postoperatively. This clinical experience made us question the diagnostic validity of colonoscopy after aortic surgery, which in turn led us to establish an evidence-based conference1
to answer the following question: is colonoscopy diagnostic for ischaemic colitis after abdominal aortic surgery? – and more specifically can colonoscopy identify transmural colitis as opposed to the more benign mucosal gangrene?

The purpose of this paper is to present the concept of evidence-based conference as a teaching modality, and to present the results of our literature search.

**Methods**

All doctors in the department were invited to participate. Before starting the conference, a general session on literature-searching was held by two doctors experienced in electronic databases. The department has several personal computers with online connection to the Internet and to the University Library of Copenhagen. The following databases were accessed: MEDLINE, 1966–1998/July, EMBASE 1974–1998/July, the web-based PubMed and The Cochrane Library. Before the first meeting, all participants had performed a literature search while trying to answer the above question. It was decided that emphasis should be put on prospective studies, and that editorials, ordinary reviews and case reports should be left out. At the first conference, each participant reported the result of the literature search, based on retrieved abstracts. The participants came to an agreement on which publications should be included in the survey and these papers were ordered from the library, if not already present. At a second conference, organised some weeks later, all participants had had time to go through all the reports. Each paper was discussed briefly and a preliminary conclusion was reached. A writing group was then formed with the aim of preparing the present report.

**Results**

No randomised studies were found, but we did identify seven prospective – but not all consecutive – reports focusing on endoscopy and ischaemic colitis after aortic surgery (Table 1). In these reports the incidence of ischaemic colitis found at endoscopy – mucosal ischaemia as well as transmural ischaemia – ranged from 3–9% following elective abdominal aortic operations to 18–60% following surgery for ruptured aneurysms.

In the first published prospective series of systematic colonoscopy after aortic surgery, as well as in the later published and larger series from the same group, no information was provided on the consequences of the colonoscopic findings in relation to treatment and outcome, i.e. seven patients died from transmural ischaemic colitis. Moreover, only 74% of patients in the larger series underwent colonoscopy (Table 1). In another American series 34 patients underwent sigmoidoscopy, tonometric pH and inferior mesenteric artery stump pressure measurements. Three patients developed “severe ischaemic colitis” and eventually died from multiple organ failure, but it was not stated if they had transmural ischaemia or if they had colonic resection. Thus, the classification seemed to be based on clinical outcome, rather than the endoscopic examination. The study by Zelenok et al. was mainly concerned with the possibility of avoiding ischaemic colitis by adjunctive surgical procedures to enhance colonic perfusion. Whether attributable to this aggressive preventive approach or not, their incidence was the lowest reported among the prospective series. Only three cases of mucosal ischaemia were encountered, and all underwent unnecessary laparotomy to rule out a suspicion of transmural ischaemia. The two Dutch studies by Scherpenisse and van Hees and by Bast et al. emanate from the same institution and the latter was probably part of the former, although not easily recognisable. The most transparent, published in this Journal, presents the details of nine cases of ischaemic colitis disclosed by routine colonoscopy. Three patients revealed “deep necrosis or gangrene”, and immediate laparotomy was undertaken. The suspicion of transmural ischaemia was confirmed in one patient only, who died from sepsis in spite of resection of gangrenous bowel. The two other patients underwent unnecessary laparotomy. In the last paper from another Dutch institution not all the patients were studied prospectively and the protocol changed during the study from including all aortic procedures to including only ruptured aortic aneurysms. This hampers the assessment of the value of colonoscopy, which in any event was negligible, since all the patients who had colonic ischaemia diagnosed in this series died from their condition. Consequently the authors argued against surgery for a diagnosis of transmural ischaemia after an emergency abdominal aneurysmectomy.

Sixteen doctors were invited to participate in the present evidence-based conference. Ten doctors participated in both conferences. Each conference lasted for 45 min and demanded active involvement of all participants. At the first conference none of the ten doctors had identified all seven prospective reports, and one was only identified during the process of peer review, by one of the reviewers. No formal evaluation
Table 1. Compilation of the available numbers presented in six different prospective reports on ischaemic colitis (IC) following aortic surgery.

<table>
<thead>
<tr>
<th></th>
<th>Aortic surgery</th>
<th>Colonoscopy</th>
<th>Laparotomy</th>
<th>IC-related deaths</th>
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<tr>
<td></td>
<td>n</td>
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<tr>
<td>Ernst (1976)(a)</td>
<td>50</td>
<td>50</td>
<td>3</td>
<td>n.a.</td>
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<tr>
<td>Hagihara (1979)(a)</td>
<td>180</td>
<td>133</td>
<td>17</td>
<td>n.a.</td>
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<tr>
<td>Schiedler (1987)</td>
<td>34</td>
<td>34</td>
<td>10</td>
<td>n.a.</td>
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<tr>
<td>Zelenock (1989)</td>
<td>100</td>
<td>100</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Scherpernisse &amp; van Hees (1989)(b)</td>
<td>n.a.</td>
<td>“all”</td>
<td>24</td>
<td>4</td>
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<tr>
<td>Bast (1990)(b)</td>
<td>100</td>
<td>100</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>Van Vroonhoven (1991)(c)</td>
<td>[n.a.]</td>
<td>15</td>
<td>15</td>
<td>20</td>
</tr>
</tbody>
</table>

The figures represent the number of patients: (1) who underwent aortic surgery, (2) who had colonoscopy performed, (3) who had IC diagnosed by colonoscopy, (4) who underwent re-laparotomy, (5) who had IC diagnosed by re-laparotomy, (6) who underwent large-bowel resection and (7) whose death was related to IC. In several instances data were not available (n.a.).

(a–a) and (b–b) Reports from the same medical centre. Bast et al.’s patients are probably included in that of Scherpernisse and van Hees.

(c) The total number of patients undergoing aortic surgery is unknown, as patients with IC were referred from more than one hospital. Sixty-one patients were operated on in the authors’ own hospital settings. Out of these, 13 had IC. The remaining seven patients with IC came from other centres.

The conference process was made. However, it is our impression that active involvement of all the participants was appreciated.

Discussion

Ischaemic colitis is a complication of considerable concern and cost. Ideally, the condition should be prevented by securing colonic perfusion. However, the pathogenesis is not completely understood, which adds to the difficulties of predicting which patients are at risk. Moreover, a number of incidents appear late in the postoperative course, hampering this “preventive approach”. Second-best is to establish the diagnosis early. Here we encounter the crux of the problem: ischaemic colitis appears in various forms from a mild mucosal involvement which should be treated conservatively, to the transmural gangrene which necessitates resection, often in vain. This also explains the discrepancy in reported incidences of ischaemic colitis. In four large retrospective series containing in total more than 13 000 patients, the overall incidence ranged between 1 and 3% and the incidence among patients operated on for ruptured aneurysm was from 2 to 6%.15-18 As opposed to the figures given in prospective endoscopy-based series of 3–9% in elective cases and 18–60% in patients operated on for rupture.9,11,13,14 The true incidence may even be higher, as none of the studies reported on systematic post-mortem examinations. Ischaemic colitis may also occur after endovascular stent grafts, a modality used increasingly for treatment of aortic aneurysm, but information is sparse.

No one doubts that endoscopy can identify ischaemic colitis. In fact the sensitivity of colonoscopy is high, as no patients died from ischaemic colitis without having ischaemic lesions identified at endoscopy. However, a large proportion of the lesions have no clinical consequence. It seems evident from the available studies that colonoscopy may not separate severe mucosal ischaemia/gangrene from transmural ischaemia, although some authors leave that impression for the reader. This may not come as a surprise, as endoscopy of the colon only visualises the lamina mucosa. Even though extensive necrotic lesions will raise suspicion of transmural ischaemia, only laparotomy can diagnose this condition with certainty.

In half of the tabulated reports patients underwent unnecessary laparotomy. This may be acceptable provided that these patients survive and those who need surgery actually benefit. This was, however, not the case, as in the identified prospective studies all patients who had transmural ischaemia eventually died.9,10,12-14 This experience is in contrast to reports of retrospectively collected data, in which colonoscopy apparently has added valuable information in selected cases, eventually leading to proper treatment and survival of several patients.3,4,7,19,20 In this context, it should be recalled, that although the mortality of transmural ischaemic colitis diagnosed only at explorative laparotomy is high, 20 to 50% still survive. Thus, at the moment, colonoscopy cannot be considered diagnostic for transmural ischaemia, but might identify patients with an increased risk of having it.

Who, then, should undergo endoscopy – and when? Some claim that only patients with aneurysm rupture should be considered.14 Though the risk is very high.
in this group, the number of patients treated electively is much higher; thus, ischaemic colitis following surgery after aneurysm rupture makes up between 30 and 50% of all cases, according to the four large series.\cite{15-16} Since most ischaemic lesions in the colon after aortic surgery are located at the sigmoid and recto-sigmoid junction flexible sigmoidoscopy will suffice.\cite{15,16} There has been some reluctance to perform endoscopy for fear of causing perforation, but it seems to be safe, as no complication was reported in any of the papers cited here. Another issue is the timing of endoscopy, which obviously is crucial. In this respect, colon pH-monitoring may offer an early warning, as suggested by Björck and Hedberg,\cite{22} confirmed in a later study from the same institution and reported at the ESVS '99 annual meeting.\cite{23} This does not alter the fact that a diagnostic modality, other than laparotomy, to distinguish mucosal from transmural ischaemia, needs to be developed or present modalities, i.e. intramucosal pH, inferior mesenteric artery stump pressure and biochemical markers, need to be evaluated systematically. Also, the role of laparotomy should be assessed.

Interestingly, none of the doctors participating in the evidence-based conference found all the seven papers through their literature search, which constituted the basis for answering the above question. The last paper was indeed found by only one of the reviewers in the process of peer-review. This may not come as a surprise for the experienced literature searcher, but emphasises the importance of education and training of doctors in search strategies when using electronic databases.

In conclusion, endoscopy will identify a large group of patients with ischaemic colitis after abdominal aortic surgery, most of it benign. We did not find any evidence in the literature that colonoscopy is capable of identifying the clinically important subgroup with transmural ischaemic colitis. A diagnostic modality, other than laparotomy, to distinguish mucosal from transmural ischaemia needs to be developed.

Conferences using evidence-based principles as a basis seem to be an efficient way of evaluating clinical problems concerning diagnostic tests, prognosis, treatment, prophylaxis and side-effects. Moreover, the conferences served as an appreciated method of training in literature searching.

References


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